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(71) Applicant
United Kingdom Atomic Energy Authority

(Incorporated in the United Kingdom)

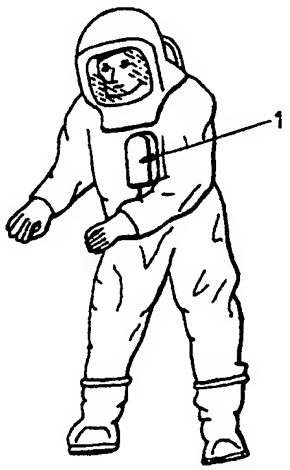
11 Charles II Street, London, SW1Y 4QP, United Kingdom

(72) Inventor
Steven Frank Hall

(74) Agent and/or Address for Service
J E Alderman
Patent Branch, United Kingdom Atomic Energy Authority, 11 Charles II Street, London, SW1Y 4QP, United Kingdom

(54) Monitoring of personnel in working environments

(57) Personnel working in environments in which they may be exposed to health risks are equipped with dosemeters 1 which may incorporate a Geiger counter. The dosemeter is linked by radio with a central remotely located monitoring station 2-5 programmed to interrogate each dosemeter periodically to read the count accumulated over the period between scans, and operate an audio signalling device so that the operative is reassured that monitoring is taking place. After each reading, the monitoring station produces a signal which resets an internal counter of the dosemeter. The central station monitors each operative's dose in terms of dose accumulated and dose rate and at a predetermined threshold level, a signal is transmitted to the relevant dosemeter so the operative can take appropriate action.



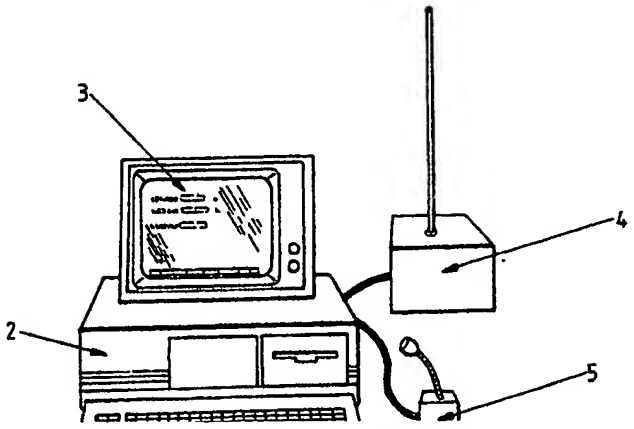


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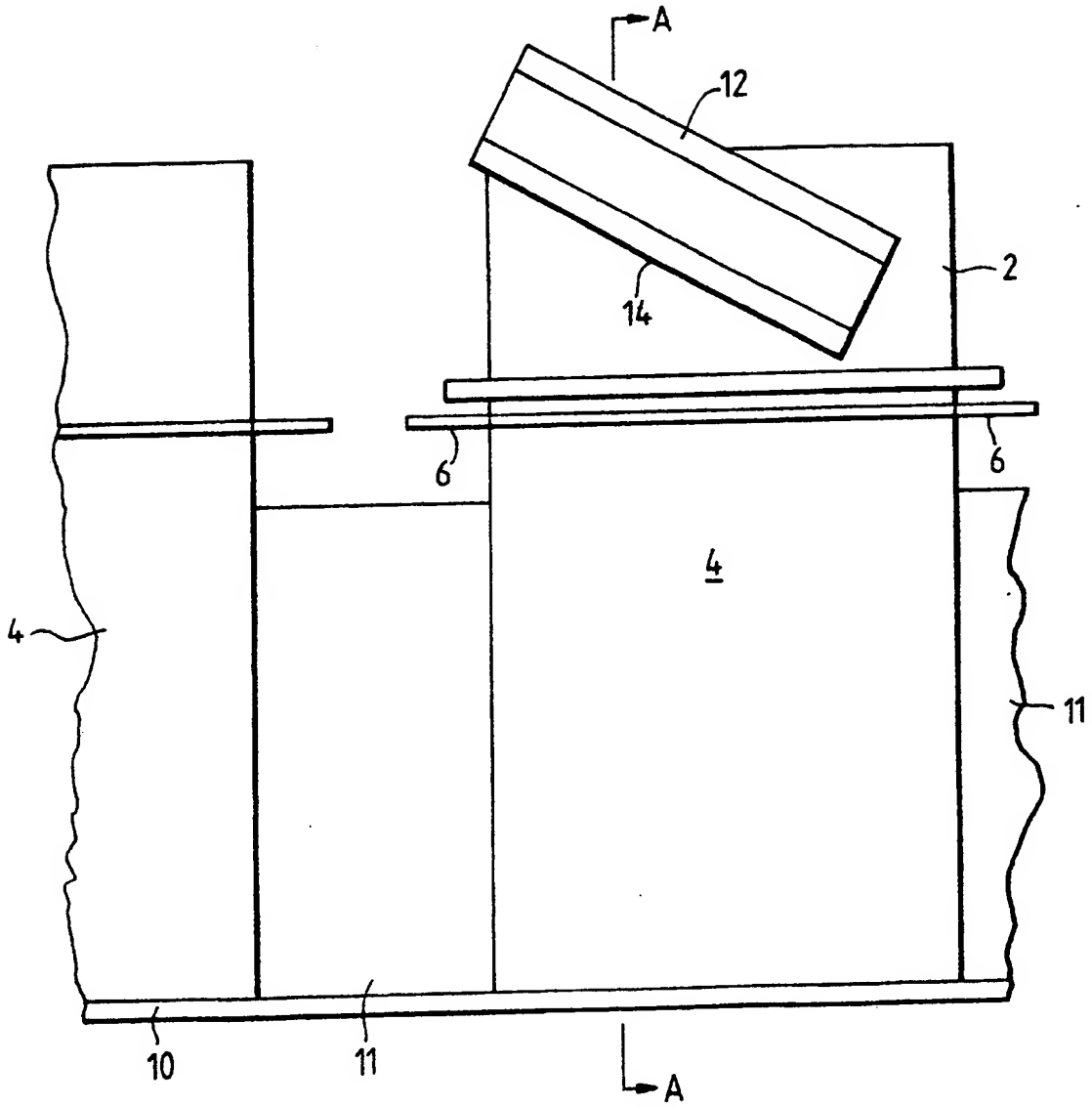
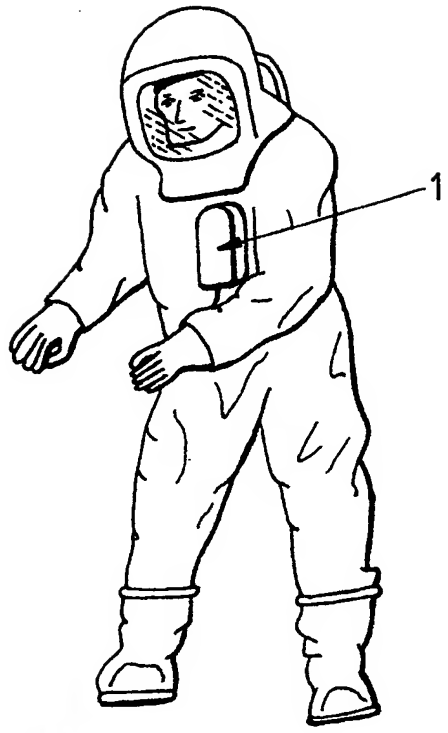
Fig. 1.

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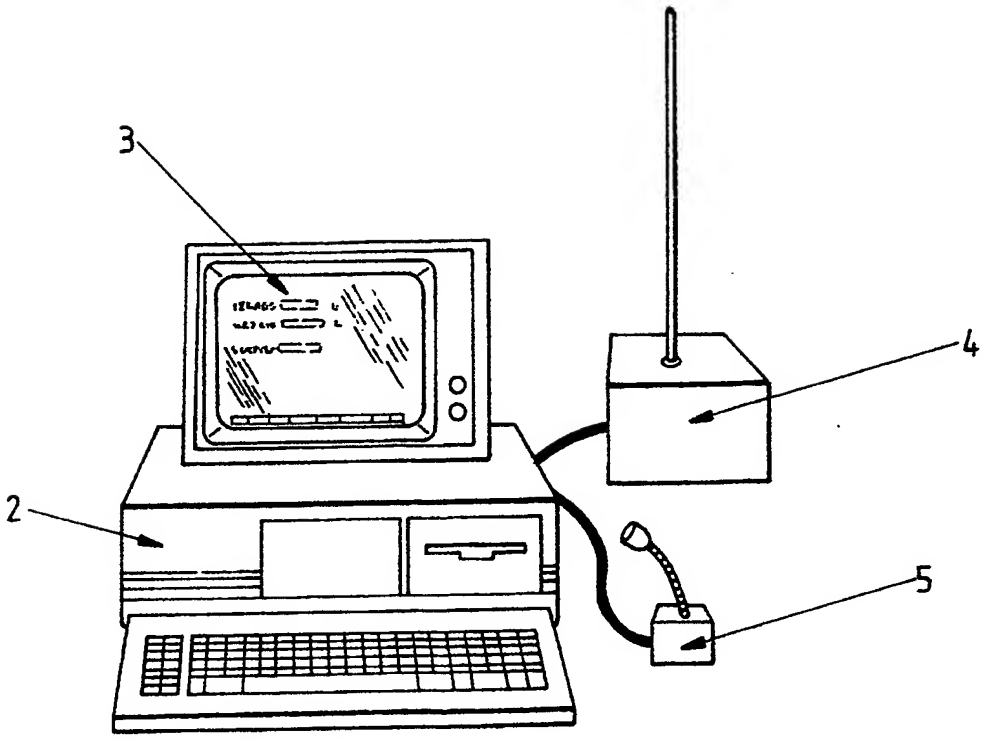
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Monitoring of personnel in working environments

This invention relates to a system for the monitoring of personnel in working environments, particularly in circumstances where such personnel are carrying out work in an environment in which they are exposed to health risks if unduly exposed to the environment.

An extreme example of a situation in which the system of the invention could have usefully been employed was the nuclear reactor accident at Chernobyl, USSR in 1986. As a result of the Chernobyl accident, 31 people died, 29 of these died from acute radiation syndrome and a further 180 required hospital treatment for acute radiation syndrome from which they subsequently recovered. All of these 203 people were firemen or other emergency workers coping with the immediate aftermath of the accident and working in areas of high radiation.

Most or indeed all of these injuries and deaths could have been avoided if the radiation exposure of these workers had been known by those directing the emergency response at the time of the exposure.

According to one aspect of the invention there is provided a system for the monitoring of personnel in working environments comprising: a plurality of portable sensor devices to be carried or worn by each of the personnel, each sensor device incorporating a radio transmitter/receiver and signalling means and being

arranged to detect and measure an entity presenting a danger to humanity; and a central computer-controlled monitoring station including radio transmitter/receiver means for periodically interrogating each of the sensor devices via the radio links to obtain, from each sensor device, the measurement derived by the respective sensor device between interrogations, means for triggering operation of the signalling means of each device each time an interrogation is made, and means for accummulating for each device the measurements retrieved whereby the exposure of the operative carrying the device can be monitored. The entity may be radiation.

Thus, if a particular operative is found to have received exposure approaching a predetermined threshold he may be instructed via the radio link to withdraw from the environment in which he is working or transfer to a different area where the exposure level is lower.

To promote further understanding of the invention, one embodiment will now be described by way of example only with reference to accompanying schematic drawing.

As shown, each worker has a portable dosemeter 1 comprising a radiation detector (eg a Geiger tube) and counter controlled by a microprocessor, the counter serving to accumulate the count received from the detector. The dosemeter also has a VHF-FM radio transmitter and receiver which are under the control of the microprocessor. Each of these remote dosemeters is

controlled from a central station which comprises a microcomputer 2 and a VHF-FM radio transmitter and receiver 4.

At the start of the operation each worker is issued with a dosemeter and his name and the number of the dosemeter entered in the microcomputer. Thereafter the dosemeter is polled periodically and automatically by the microcomputer by means of the VHF-FM radio link in the following manner.

The central station microcomputer 2 sends out an instruction over the radio link for a given dosemeter to transmit its received radiation dose since last time it was polled. This dose is derived from the counter associated with the built-in microprocessor. The dosemeter obeys this instruction and at the same time gives the emergency worker an audible signal through headphones that this has occurred. This is to reassure him that the system is operational. The communications hardware and software is arranged so that a high degree of reliability is achieved through the use of appropriate protocols.

On receipt of the signal from the nominated remote dosemeter the control station microcomputer updates its record for the particular worker and displays the current cumulative dose graphically on the VDU 3. Also displayed are maximum dose allowed and time remaining before the limit is reached at the current dose rate.

The central station then generates a signal to reset the counter of the dosemeter just polled and goes on to poll the other remote dosemeters in turn. The entire sequence is thereafter repeated, each polling cycle taking for instance 1 to 2 seconds.

By this means the central station has virtually instantaneous data on the individual dose rates and cumulative doses received by the workers being monitored.

The central station is also equipped with a microphone 5 and the computer can send a message to a given remote dosemeter (or indeed all the remote dosemeters at the same time) to receive a voice message from the controller which is then relayed to the worker via headphones worn by each worker and connected to the respective dosemeter.

Because the dose received by each worker is known at the time it is being received he can be recalled or redeployed when his cumulative dose nears a prescribed limit and hence using this system the controller can efficiently deal with a particular emergency while ensuring that none of the workers under his control receive exposure above a prescribed level within safety limits.

Although, as described above, the system is intended for use in situations involving exosure to radiation, the invention also has application to situations involving

biologically hazardous environments such as chemicals, toxic gases etc.

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Claims

1. A system for the monitoring of personnel in working environments comprising: a plurality of portable sensor devices to be carried or worn by each of the personnel, each sensor device incorporating a radio transmitter/receiver and signalling means and being arranged to detect and measure an entity presenting a danger to humanity; and a central computer-controlled monitoring station including radio trasmitter/receiver means for periodically interrogating each of the sensor devices via the radio links to obtain, from each sensor device, the measurement derived by the respective sensor device between interrogations, means for triggering operation of the signalling means of each device each time an interrogation is made, and means for accummulating for each device the measurements retrieved whereby the exposure of the operative carrying the device can be monitored.

2. A system for the monitoring of personnel in working environments substantially as hereinbefore described with reference to the accompanying drawing.